

Amendments to the Claims:

- 1 (Currently amended) A flat-panel direct methanol fuel cell (DMFC), comprising:
an integrated cathode electrode sheet comprising a first copper clad laminate (CCL)
substrate, a plurality of cathode electrode areas, a plurality of first conductive via through
5 holes, wherein each of the cathode electrode areas is electroplated on a front side and
backside of the first CCL substrate and has a plurality of first apertures therein, wherein
the first conductive via through holes are disposed outside the cathode electrode areas and
are electrically connected to respective cathode electrode areas with a conductive wire;
wherein surface area of the first apertures within each of the cathode electrode areas is
10 more than 50% of surface area of each of the cathode electrode areas;
a membrane electrode assembly (MEA) unit comprising a plurality of proton
exchange membranes corresponding to the plurality of cathode electrode areas;
an intermediate bonding layer comprising at least one bonding sheet, wherein the
intermediate bonding layer comprises a plurality of openings for respectively
15 accommodating the plurality of proton exchange membranes, and a plurality of second
conductive via through holes that are aligned with the first conductive via through holes;
an integrated anode electrode sheet comprising a second CCL substrate, a plurality
of anode electrode areas corresponding to the plurality of the ~~anode~~ cathode electrode
areas, wherein each of the anode electrode areas is electroplated on a front side and
20 backside of the second CCL substrate and has a plurality of second apertures therein, and
a plurality of conductive pads are disposed outside the anode electrode areas and
corresponding to the second conductive via through holes; wherein surface area of the
second apertures within each of the anode electrode areas is more than 50% of surface
area of each of the anode electrode areas; and
25 a fuel container mounted on the integrated anode electrode sheet.

- 2 (Previously presented) The flat-panel direct methanol fuel cell of claim 1 wherein
both of the anode electrode area and the cathode electrode area comprise a copper clad

base layer, a chemically deposited copper layer on the copper clad base layer, an electroplated copper layer on the chemically deposited copper layer, and a conductive protection layer on the electroplated copper layer.

5 3 (Currently amended) The flat-panel direct methanol fuel cell of claim 2 wherein the conductive protection layer comprises [[Ni/Au]] nickel and gold.

4 (Original) The flat-panel direct methanol fuel cell of claim 1 wherein proton exchange membrane is a solid-state proton exchange membrane.

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5 (Original) The flat-panel direct methanol fuel cell of claim 1 wherein the bonding sheet is made of Prepreg B-stage resin.

6 (Original) The flat-panel direct methanol fuel cell of claim 5 wherein the Prepreg
15 B-stage resin can be completely cured at about 140°C for a time period of about 30 minutes.

7-8 (Canceled)

20 9 (Original) The flat-panel direct methanol fuel cell of claim 1 wherein, in assembly, the MEA unit is installed into the openings of the intermediate bonding layer, which is then adhesively sandwiched by the integrated cathode electrode sheet and the integrated anode electrode sheet, wherein the conductive via through holes of the integrated cathode electrode sheet are aligned, and in contact, with respective conductive via through holes
25 of the intermediate bonding layer, which are aligned with the conductive via through holes of the integrated thin anode electrode sheet.

10-15 (Canceled)

16 (Previously presented) The flat-panel direct methanol fuel cell of claim 1 wherein both of the first and second CCL substrate comprise a base layer, a first copper layer laminated on an upper surface of the base layer, and a second copper layer laminated on a
5 lower surface of the base layer.

17 (Previously presented) The flat-panel direct methanol fuel cell of claim 16 wherein the base layer is made of glass fiber reinforced polymeric materials.

10 18 (Previously presented) The flat-panel direct methanol fuel cell of claim 17 wherein the glass fiber reinforced polymeric materials comprise ANSI-grade FR-1, FR-2, FR-3, FR-4, FR-5, CEM-1 or CEM-3.

15 19. (Previously presented) The flat-panel direct methanol fuel cell of claim 1 further comprising a control circuit layout integrated on the first or second CCL substrate for controlling the DMFC and an external circuit.

20 20. (Previously presented) The flat-panel direct methanol fuel cell of claim 1 wherein both of the integrated cathode electrode sheet and the integrated anode electrode sheet are coated with a layer of solder resist.

25 21. (Previously presented) The flat-panel direct methanol fuel cell of claim 1 wherein the corresponding first conductive via through hole of the integrated cathode electrode sheet, the second conductive via through hole of the intermediate bonding layer, and the conductive pad of the integrated anode electrode sheet are soldered together.